

### AMENDMENTS TO THE CLAIMS

1. (Currently amended) A waveguide conversion device comprising:  
a rectangular waveguide ~~that has a rectangular cross sectional shape, extends in a predetermined longitudinal direction, and transmits high frequency signals of the  $TE_{10}$ -mode; and~~  
a circular waveguide ~~that has a circular cross sectional shape, is connected to an H plane of the rectangular waveguide at right angles, and transmits high frequency signals of the  $TM_{01}$ -mode; and~~ wherein  
an unnecessary-wave suppression groove is provided in a mode conversion part between the rectangular waveguide and the circular waveguide, the unnecessary-wave suppression groove preventing an unnecessary transmission mode from being excited in the circular waveguide when high frequency signals are transmitted between the waveguides.

2. (Currently amended) The waveguide conversion device according to Claim 1, wherein the unnecessary-wave suppression groove is provided in either one or both of the rectangular waveguide and the circular waveguide and extends in a direction that is perpendicular to an electric field component of ~~the  $TE_{11}$ -mode in the circular waveguide that is the unnecessary transmission mode so as to have a length of one half or more than one half of the length of one wave of the high frequency signals.~~

3. (Currently amended) The waveguide conversion device according to Claim 1 ~~or 2~~, wherein the unnecessary-wave suppression groove is provided in the rectangular waveguide at a position corresponding to an axis of the circular waveguide.

4. (Currently amended) The waveguide conversion device according to Claim 1 ~~or 2~~, wherein the unnecessary-wave suppression groove is provided in the circular waveguide.

5. (Currently amended) The waveguide conversion device according to Claim 1 ~~any one of Claims 1 to 4~~, further comprising wherein an alignment part is provided between the rectangular waveguide and the circular waveguide, ~~the alignment part being inserted into a part of the unnecessary-wave suppression groove when the waveguides are connected to each other~~ to align the rectangular waveguide with the circular waveguide when the waveguides are connected to each other.

6. (Currently amended) A waveguide rotary joint comprising: ~~two pieces of the waveguide conversion device according to any one of Claims 1 to 5,~~

a first waveguide conversion device, the first waveguide device including a first rectangular waveguide, a first circular waveguide connected to the first rectangular waveguide, and a first unnecessary-wave suppression groove provided in a mode conversion part between the first rectangular waveguide and the first circular waveguide, the first unnecessary-wave suppression groove preventing an unnecessary transmission mode from being excited in the first circular waveguide when signals are transmitted between the first rectangular waveguide and the first circular waveguide;  
and

a second waveguide conversion device, the second waveguide device including a second rectangular waveguide, a second circular waveguide connected to the second rectangular waveguide, and a second unnecessary-wave suppression groove provided in a mode conversion part between the second rectangular waveguide and the second circular waveguide, the second unnecessary-wave suppression groove preventing an unnecessary transmission mode from being excited in the second circular

waveguide when signals are transmitted between the second rectangular waveguide and the second circular waveguide,

wherein circular waveguides of the ~~individual~~ first and second waveguide conversion devices are disposed on ~~the same~~ a common axis and connected to each other so that the first and second circular waveguides are rotatable with respect to each other.

7. (Currently amended) An antenna device comprising: ~~two pieces of the waveguide conversion device according to any one of Claims 1 to 5, wherein circular waveguides of the individual waveguide conversion devices are disposed on the same axis and connected to each other so that the circular waveguides are rotatable, and either of the waveguide conversion devices includes~~

the waveguide rotary joint according to Claim 6; and

a radiator for wireless communication connected to at least one of the first and second waveguide conversion devices.

8. (New) The waveguide conversion device according to Claim 1, wherein the rectangular waveguide transmits  $TE_{10}$  mode signals; and the circular waveguide transmits  $TM_{01}$  mode signals.

9. (New) The waveguide conversion device according to Claim 1, wherein the circular waveguide is connected to an H plane of the rectangular waveguide.

10. (New) The waveguide conversion device according to Claim 9, wherein the circular waveguide is connected to the rectangular waveguide at a right angle.

11. (New) The waveguide conversion device according to Claim 1, wherein the circular waveguide is connected to the rectangular waveguide at a right angle.

12. (New) The waveguide conversion device according to Claim 1, wherein the unnecessary transmission mode is a  $TE_{11}$  mode.

13. (New) The waveguide conversion device according to Claim 1, wherein the unnecessary-wave suppression groove has a length of one half or more than one half of a length of one wave of the signals transmitted between the waveguides.

14. (New) The waveguide conversion device according to Claim 5, wherein the alignment part is inserted into a part of the unnecessary-wave suppression groove when the rectangular and circular waveguides are connected to each other.

15. (New) The waveguide conversion device according to Claim 1, wherein the unnecessary-wave suppression groove has a U-shaped structure.

16. (New) The waveguide conversion device according to Claim 1, wherein the unnecessary-wave suppression groove has a rectangular cross-section.

17. (New) The waveguide conversion device according to Claim 1, wherein the unnecessary-wave suppression groove is disposed at a position corresponding to a 0-0 axis of the circular waveguide.

18. (New) The waveguide conversion device according to Claim 1, wherein the unnecessary-wave suppression groove is a first unnecessary-wave suppression groove, and the waveguide conversion device further comprises a second unnecessary-wave suppression groove provided at the mode conversion part between the rectangular waveguide and the circular waveguide.

19. (New) The waveguide conversion device according to Claim 18, wherein the second unnecessary-wave suppression groove is disposed at a position

corresponding to the center 0 axis of the circular waveguide and intersects the first groove.

20. (New) The waveguide conversion device according to Claim 18, wherein the first unnecessary-wave suppression groove is U-shaped and the second unnecessary-wave suppression groove is L-shaped.